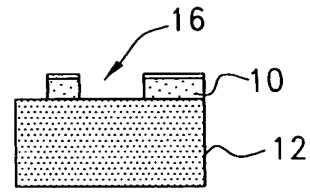
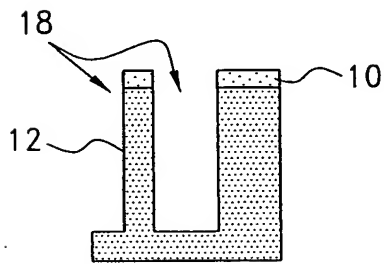


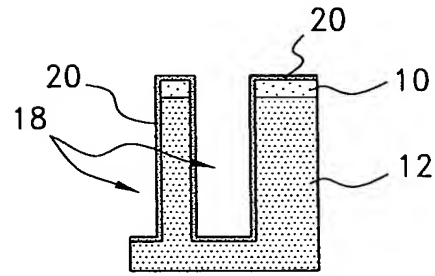
**FIG. 1(a)**  
(prior art)



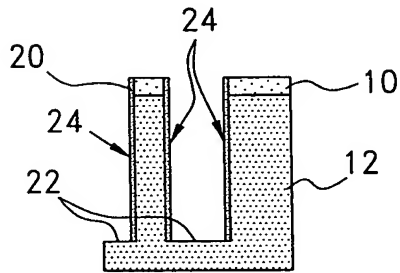
**FIG. 1(b)**  
(prior art)



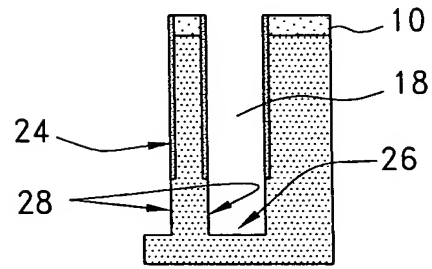
**FIG. 1(c)**  
(prior art)



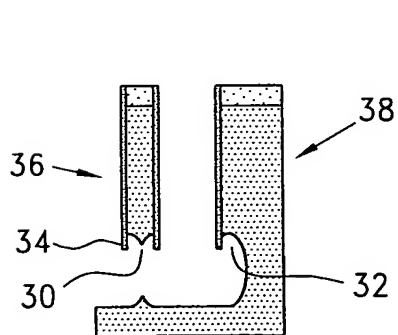
**FIG. 1(d)**  
(prior art)



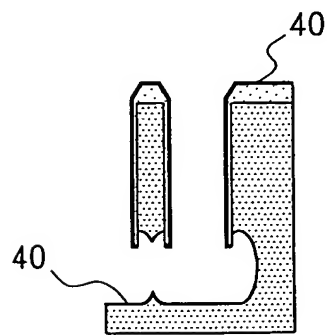
**FIG. 1(e)**  
(prior art)



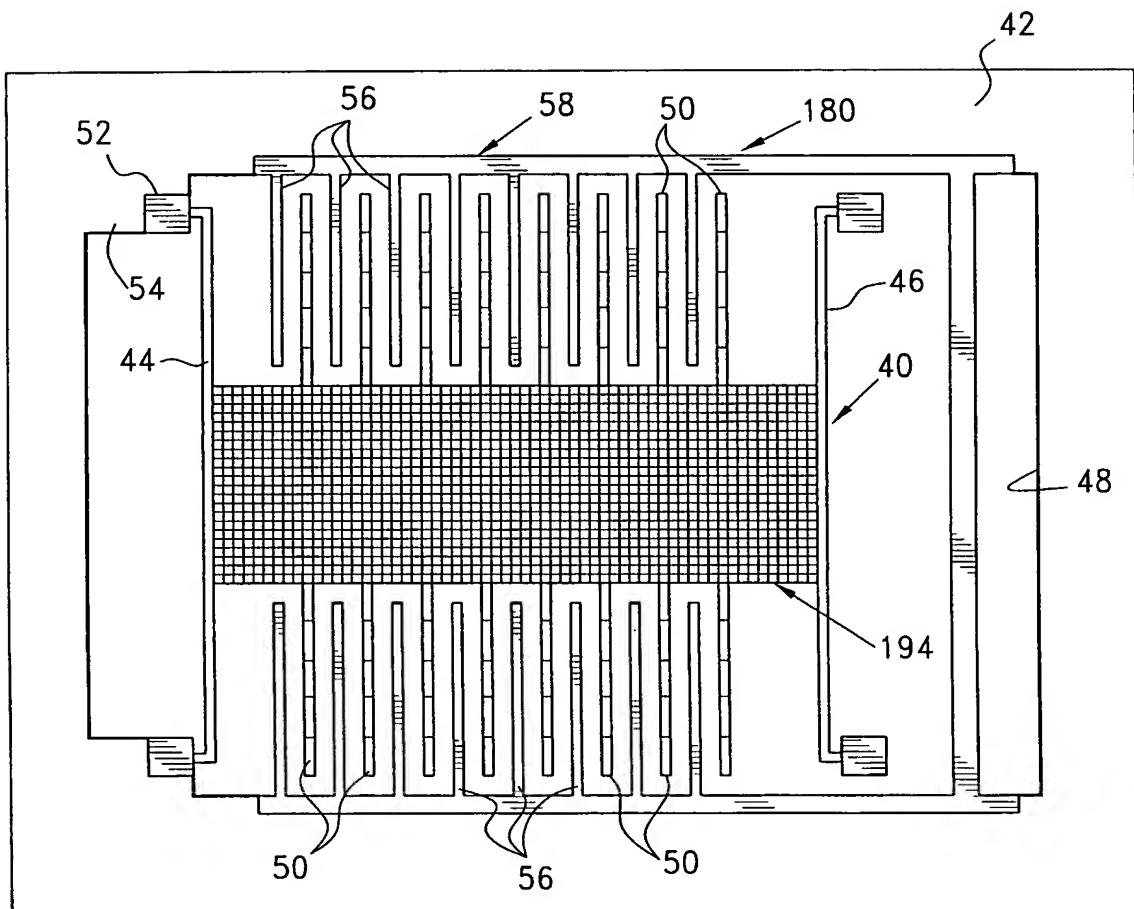
**FIG. 1(f)**  
(prior art)



**FIG. 1(g)**  
(prior art)



**FIG. 1(h)**  
(prior art)



**FIG.2**  
(prior art)

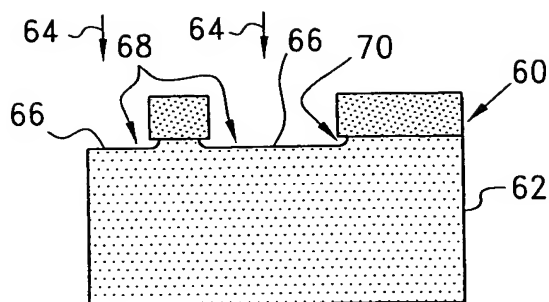


FIG. 3(a)

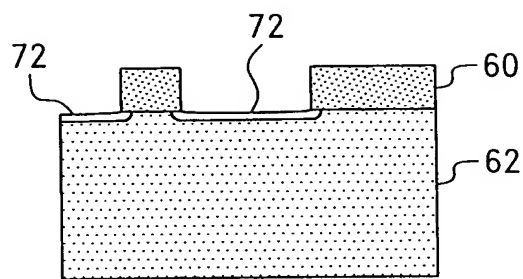


FIG. 3(b)

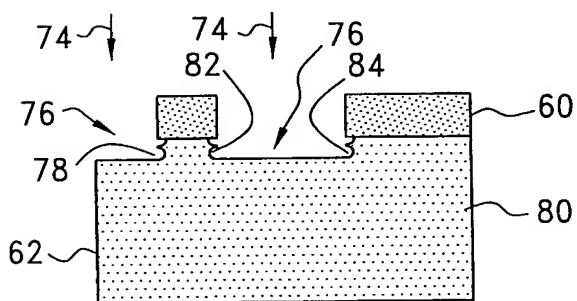


FIG. 3(c)

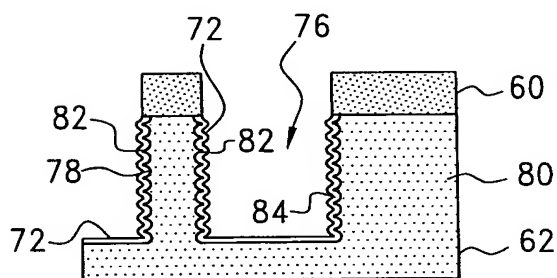


FIG. 3(d)

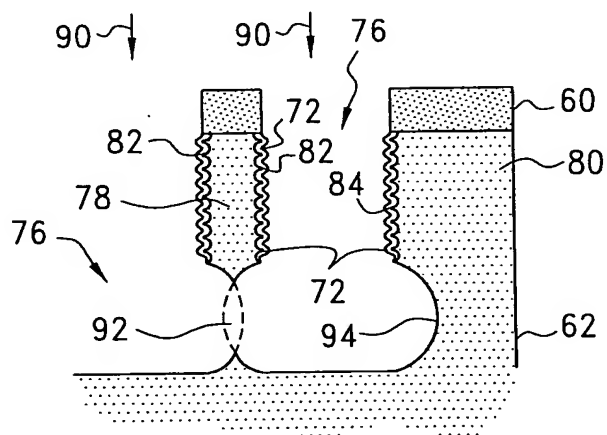


FIG. 3(e)

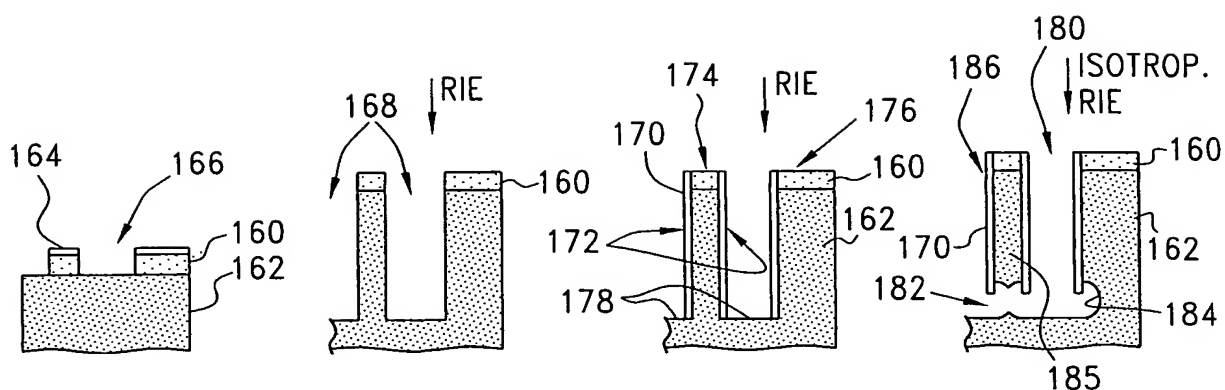


FIG. 4(a) FIG. 4(b) FIG. 4(c) FIG. 4(d)

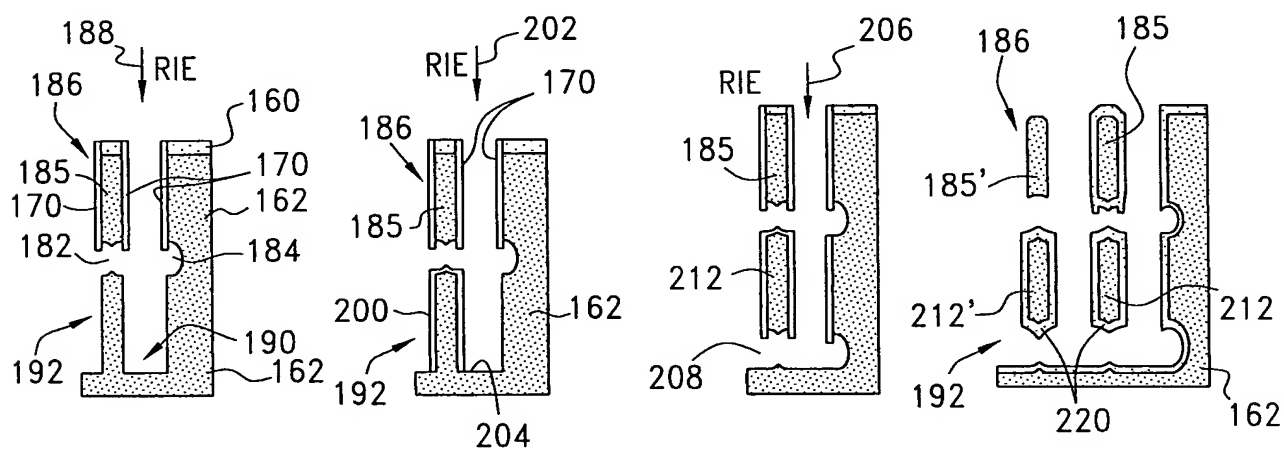


FIG. 4(e) FIG. 4(f) FIG. 4(g) FIG. 4(h)

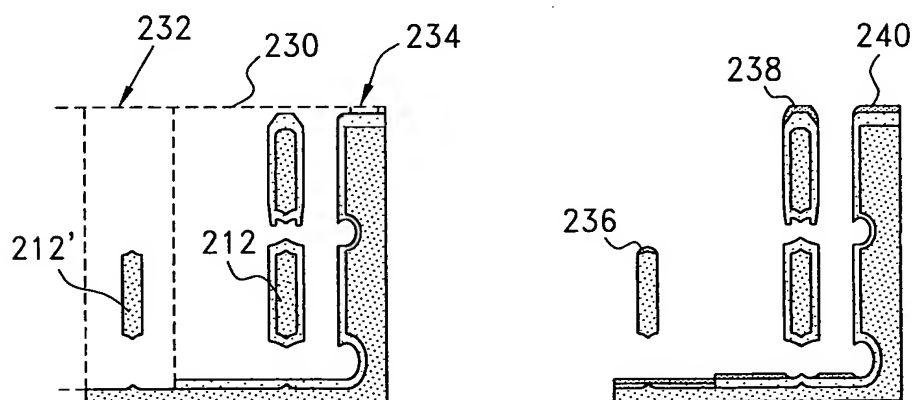


FIG. 4(i)

FIG. 4(j)

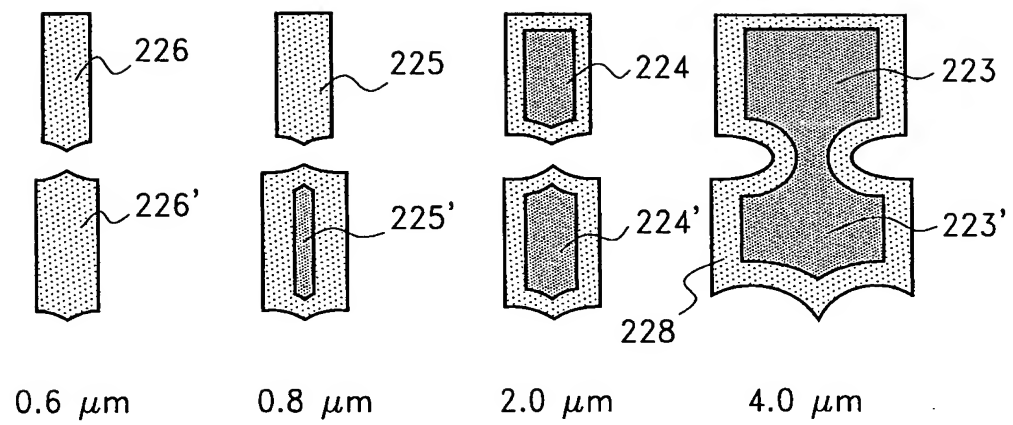


FIG.5

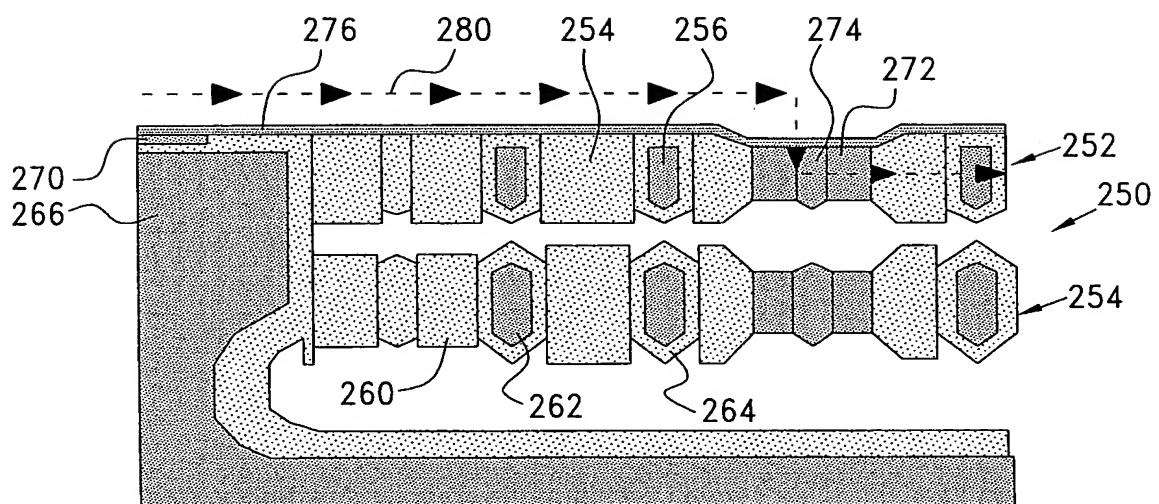


FIG.6(a)

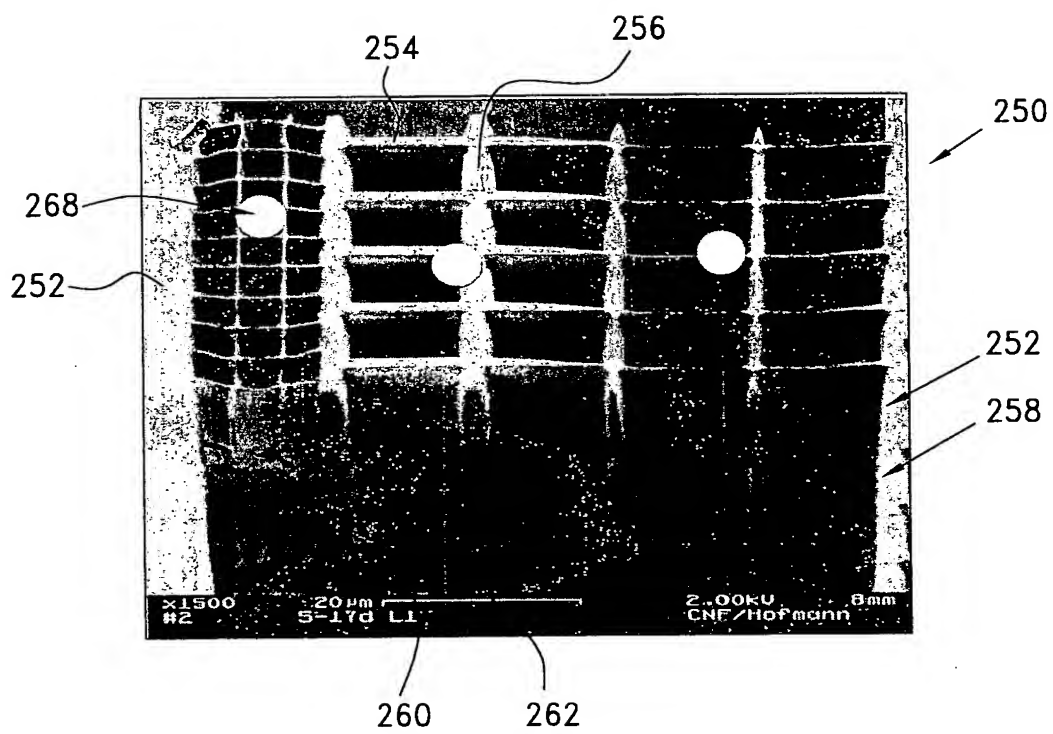


FIG.6(b)

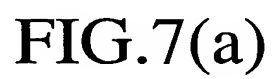


FIG.7(a)



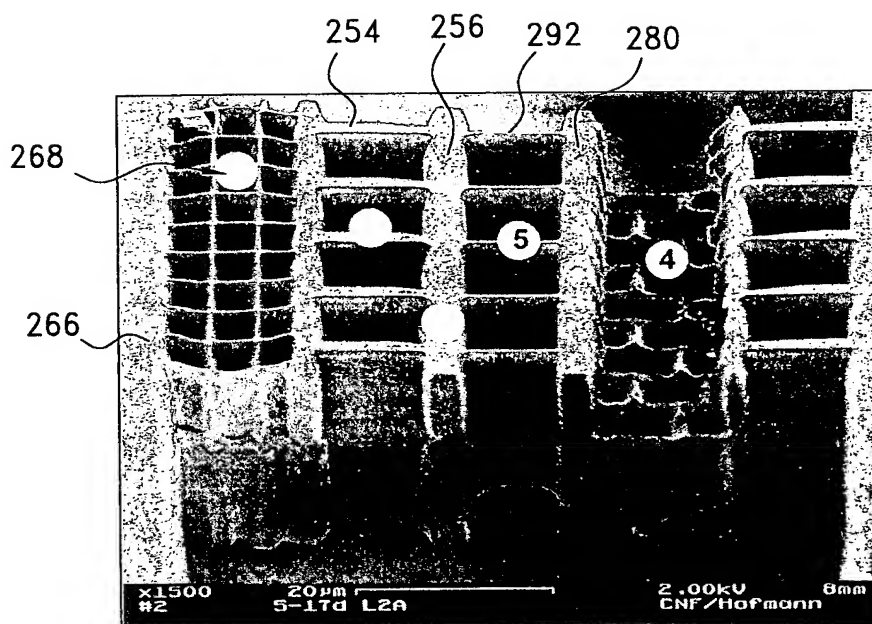


FIG.7(b)

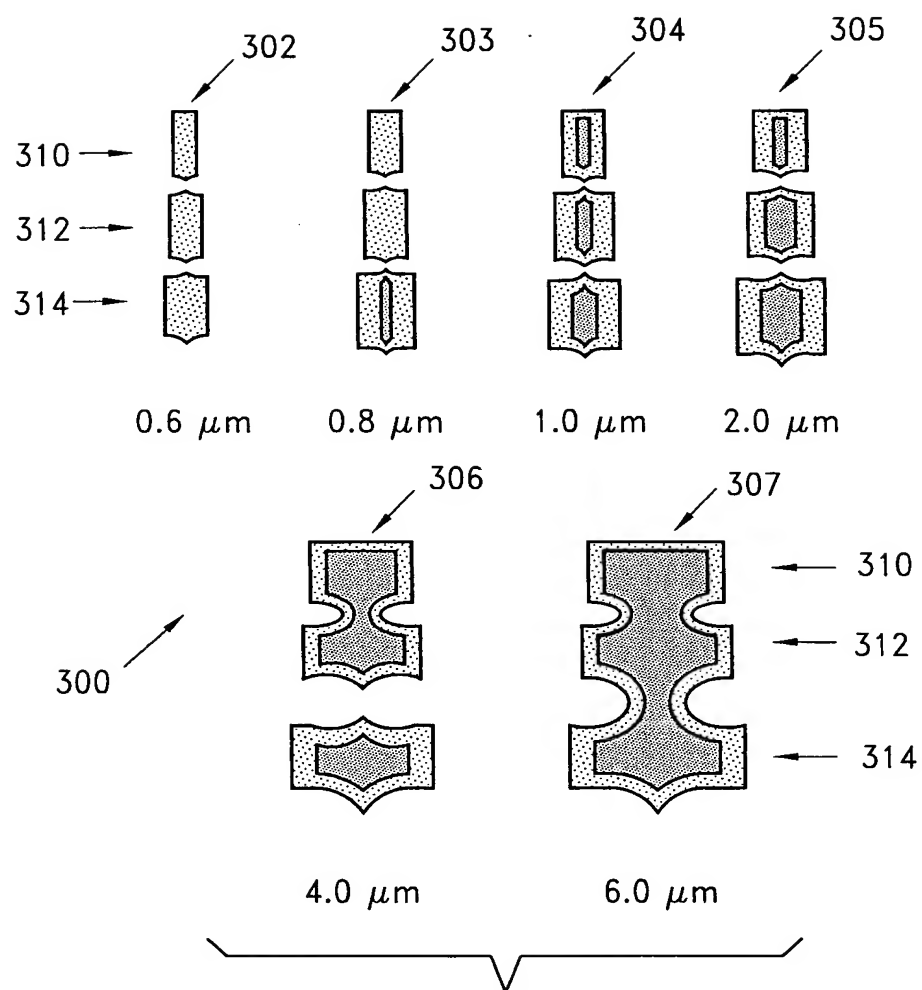


FIG.8

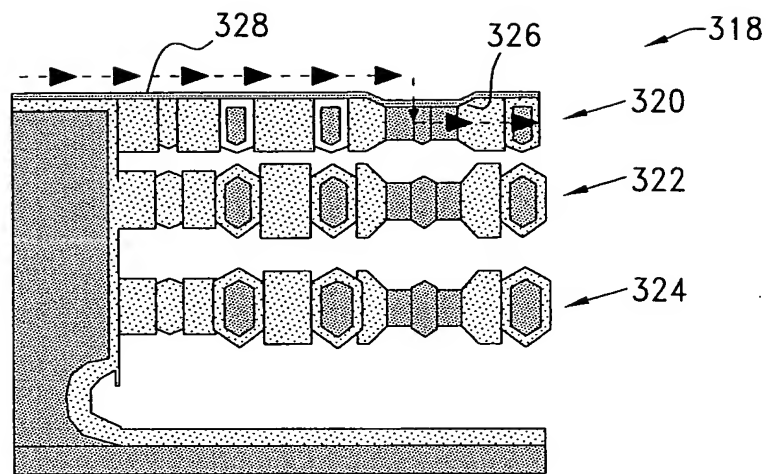


FIG. 9(a)

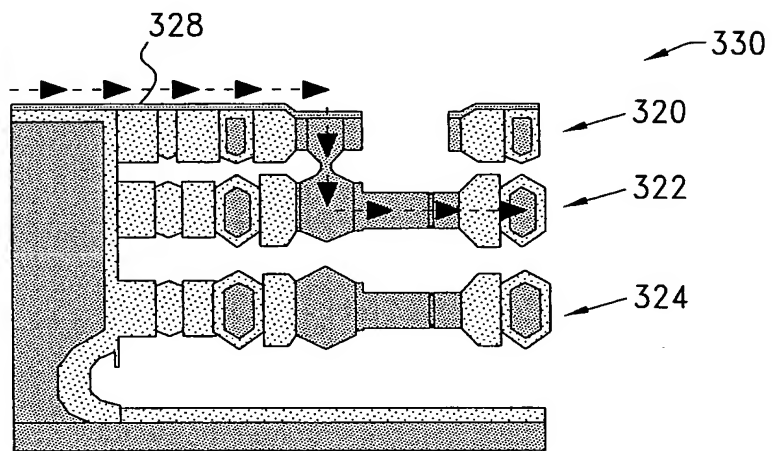


FIG. 9(b)

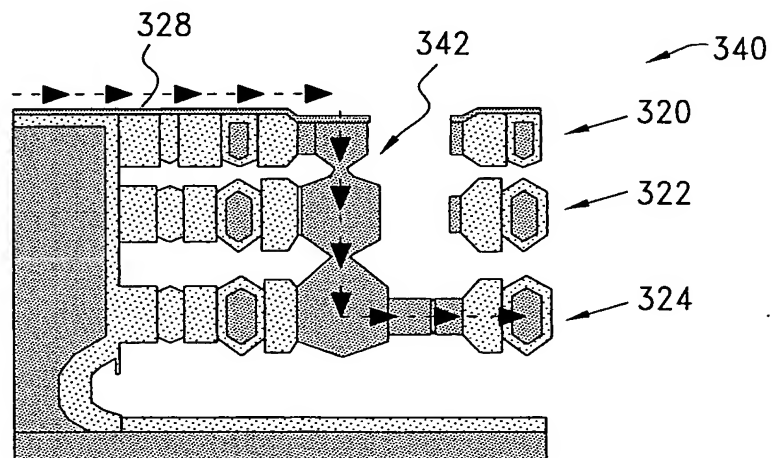
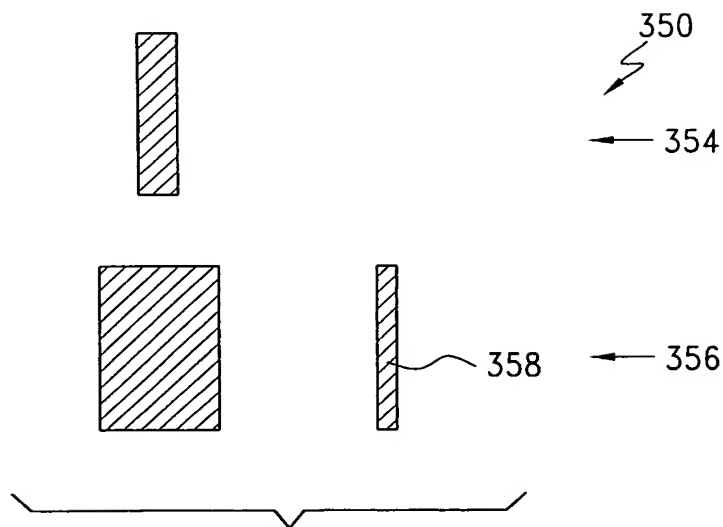
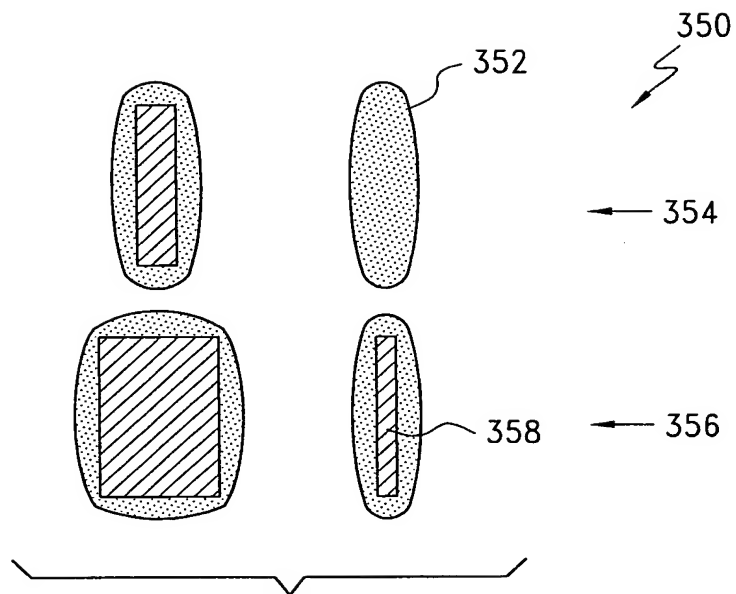


FIG. 9(c)



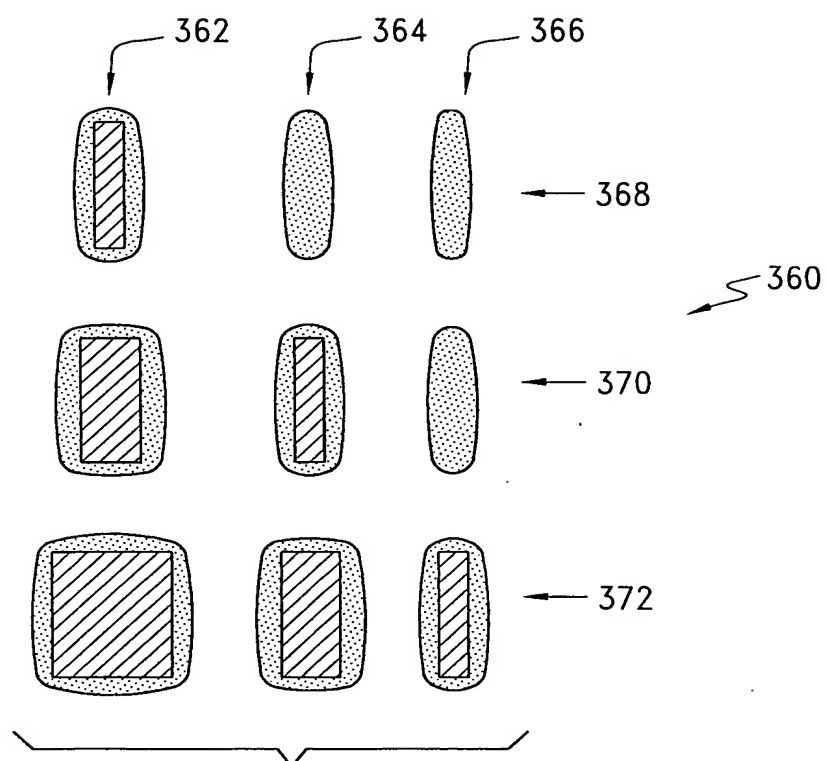


FIG.12

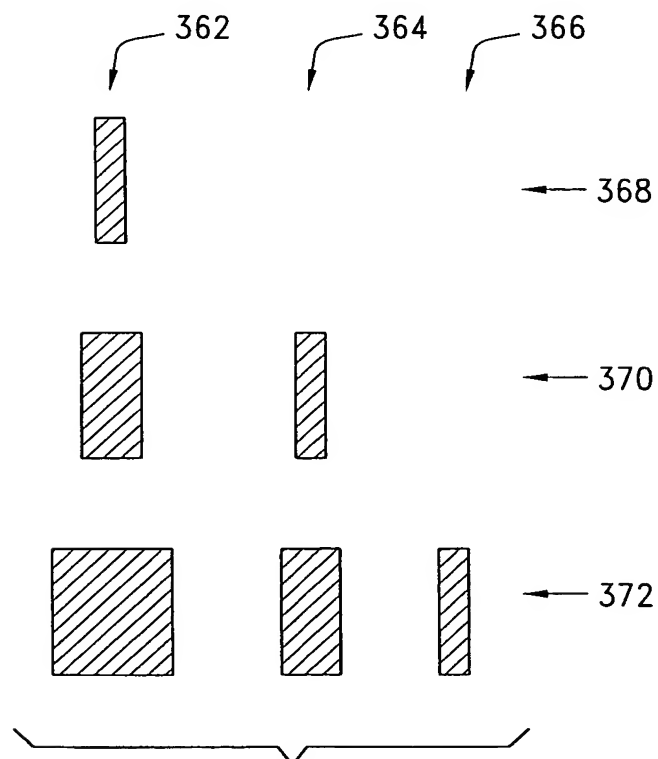
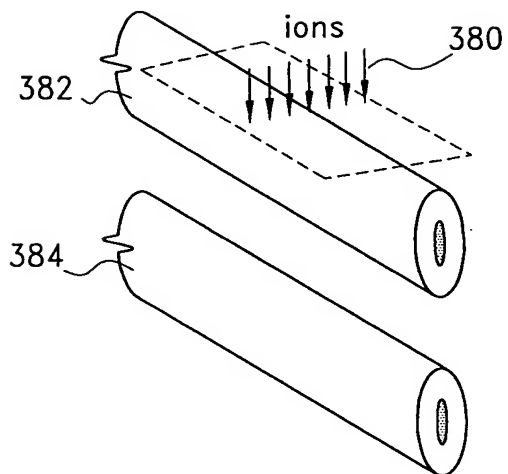



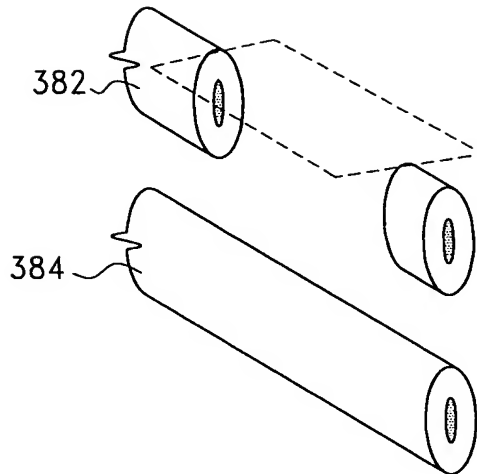
FIG.13



 -Window of FIB exposure

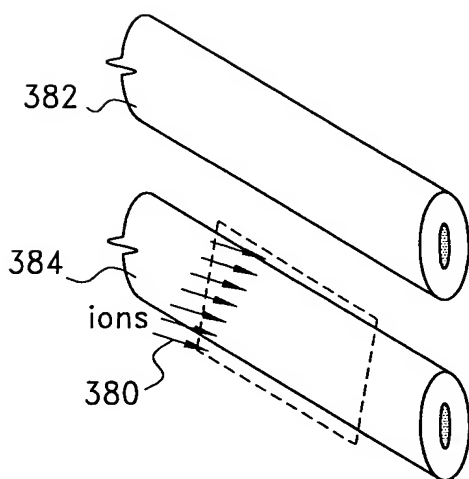
**FIG. 14(a)**

-Upper Level  
before



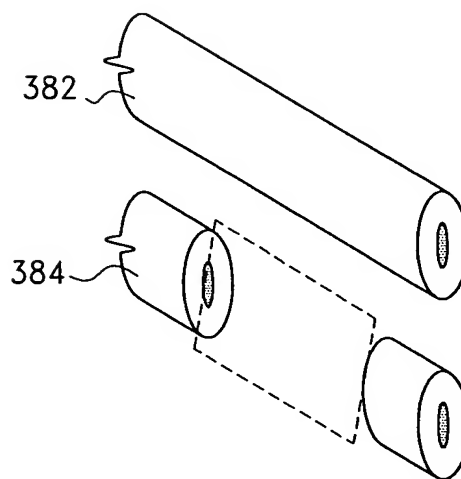
**FIG. 14(b)**

-Upper Level  
after



**FIG. 15(a)**

-Lower Level



**FIG. 15(b)**

-Lower Level

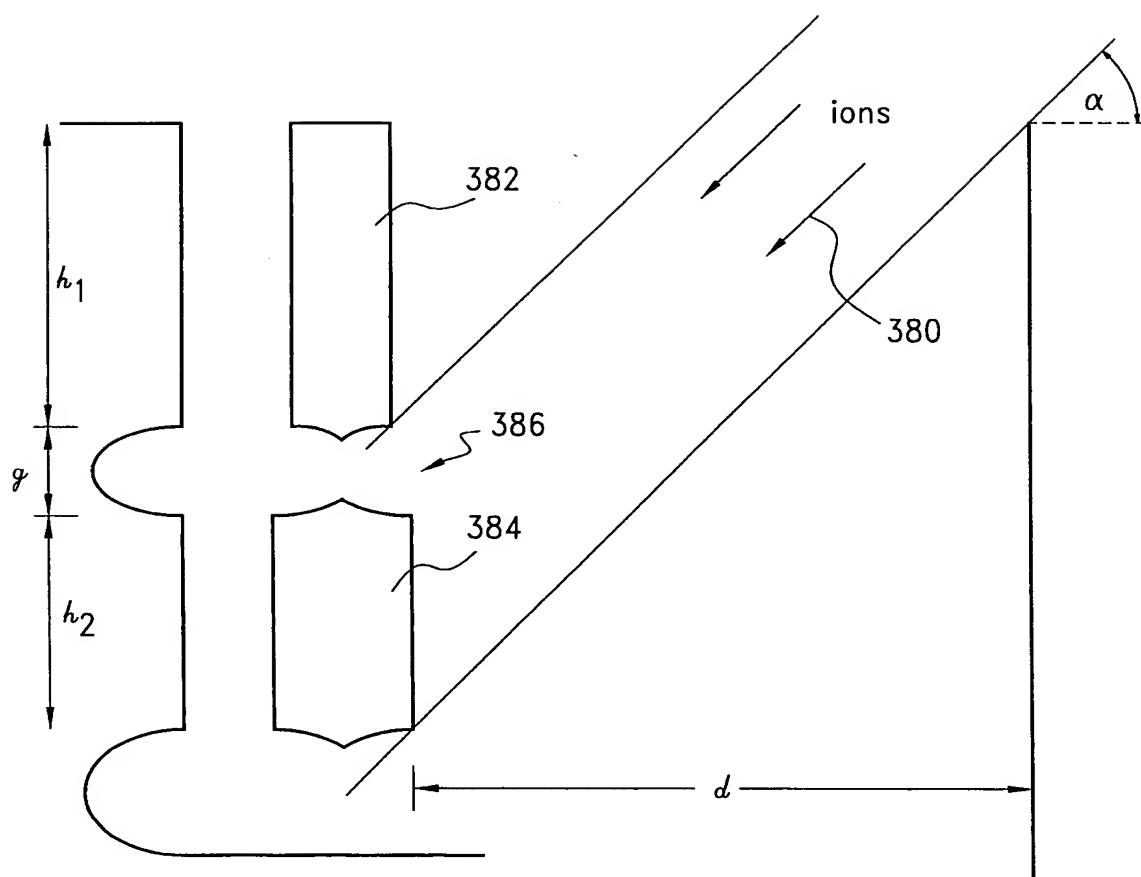
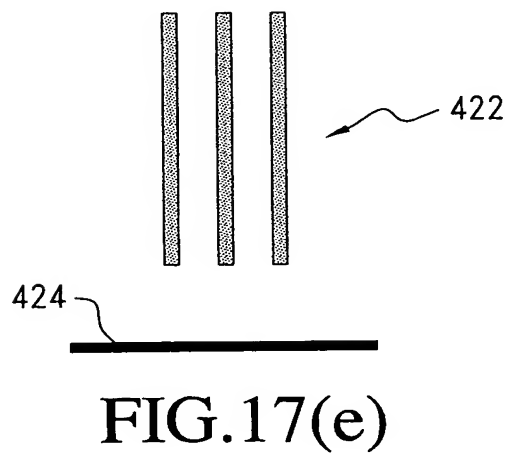
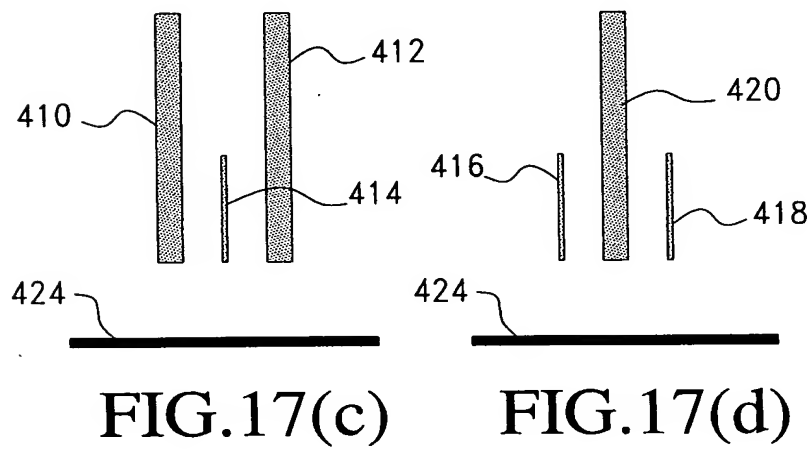
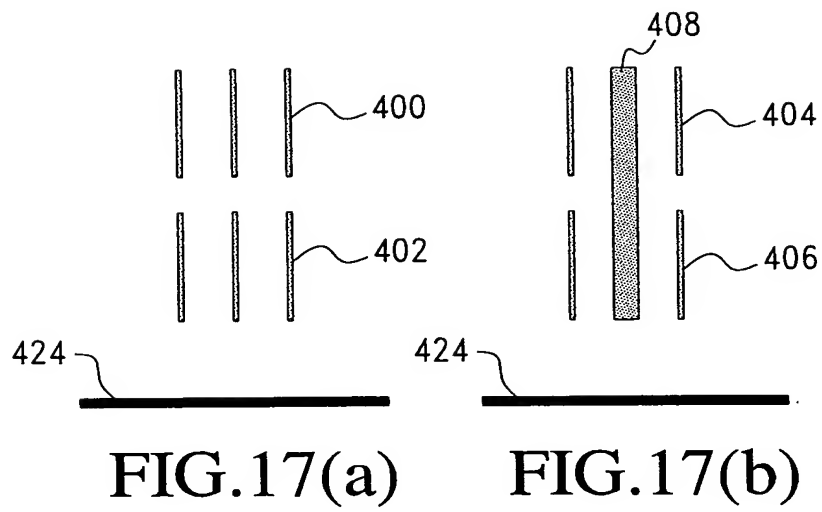


FIG.16





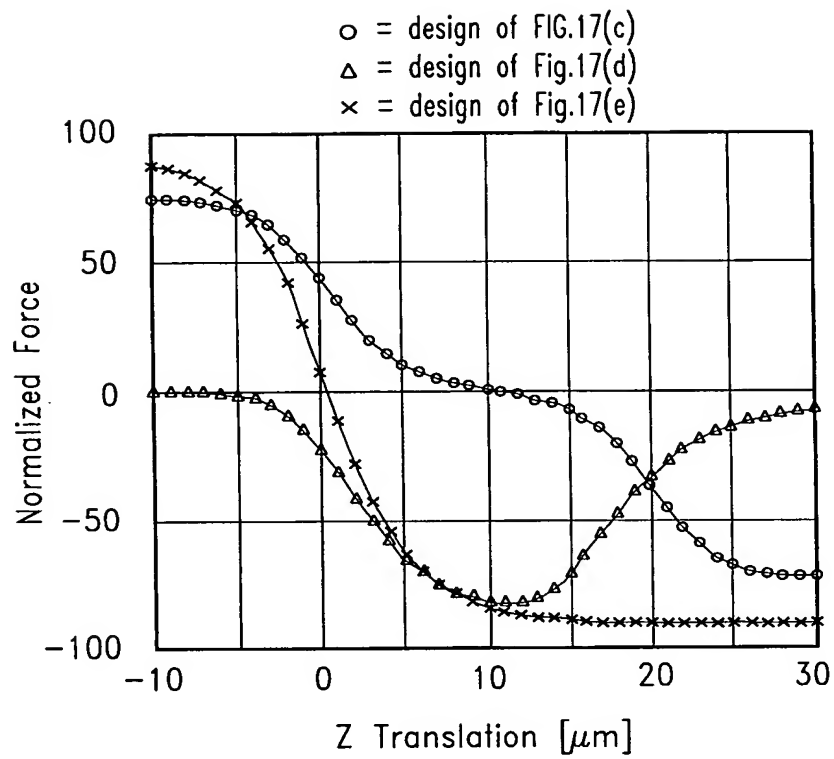


FIG.18

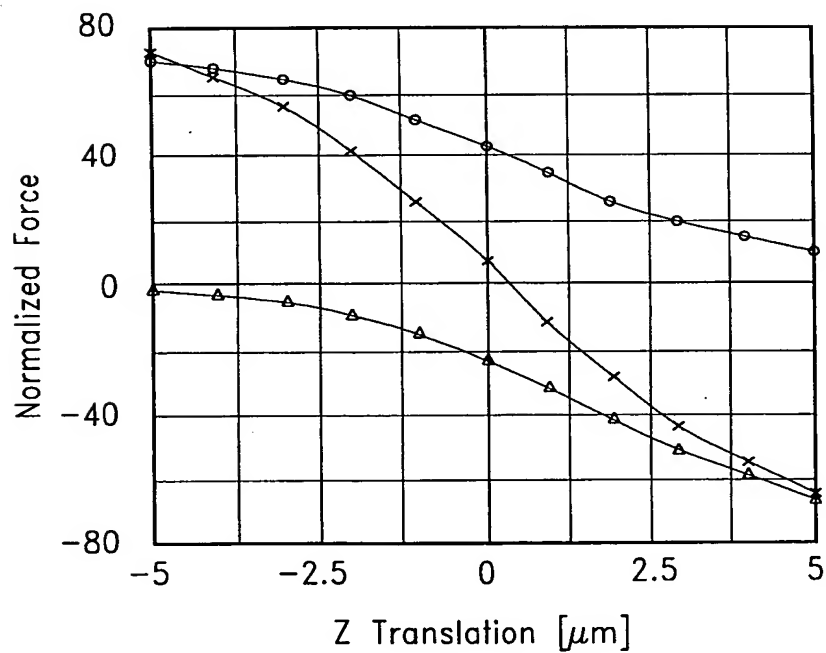


FIG.19

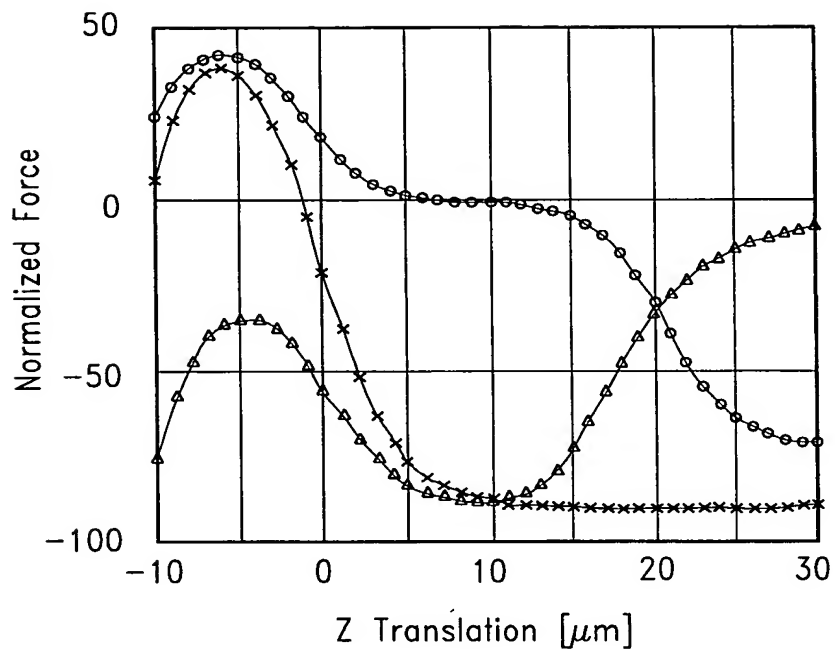


FIG.20

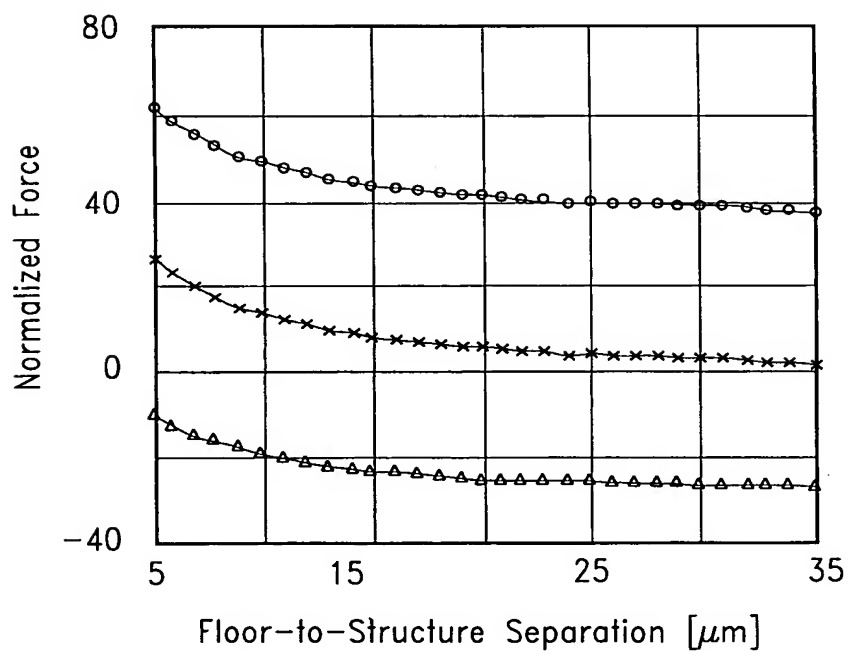


FIG.21

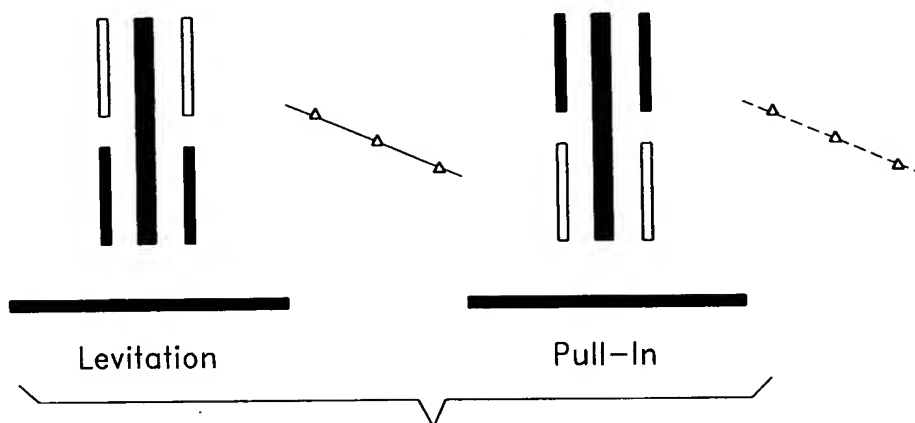


FIG.22

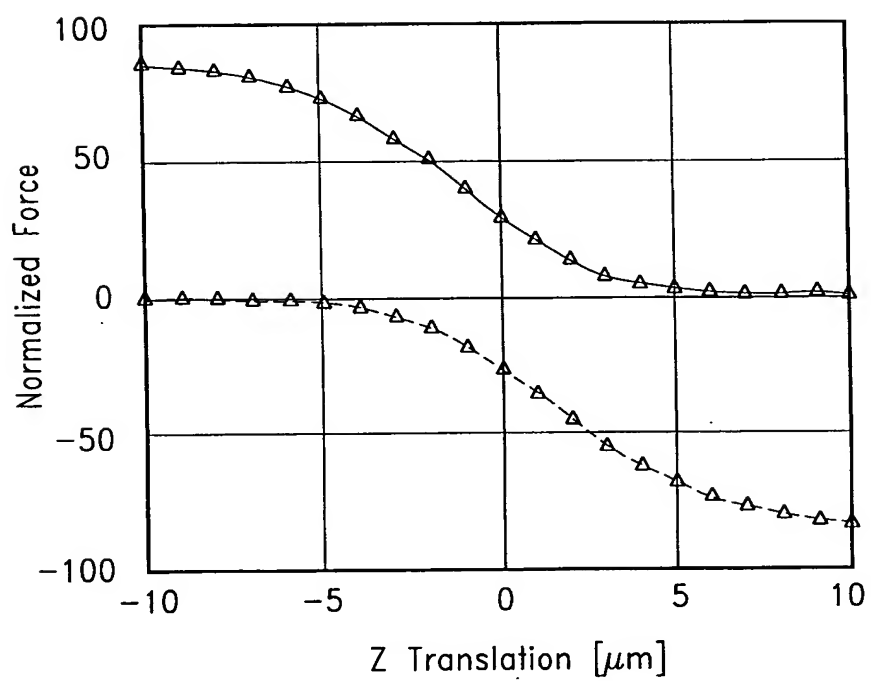


FIG.23

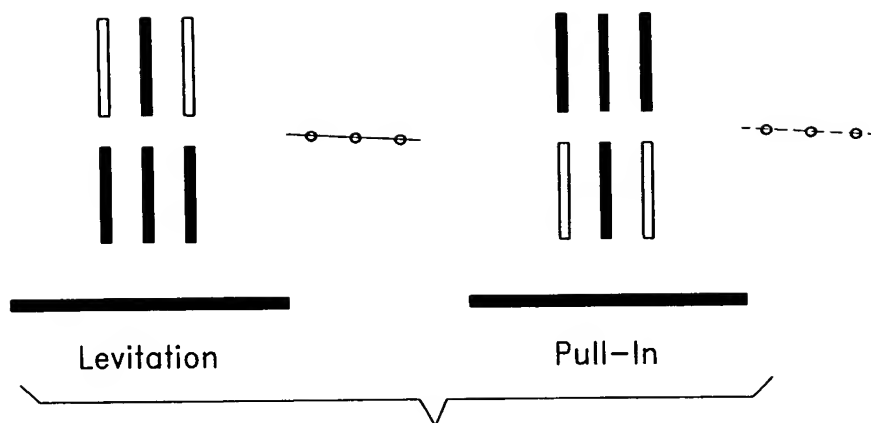


FIG.24

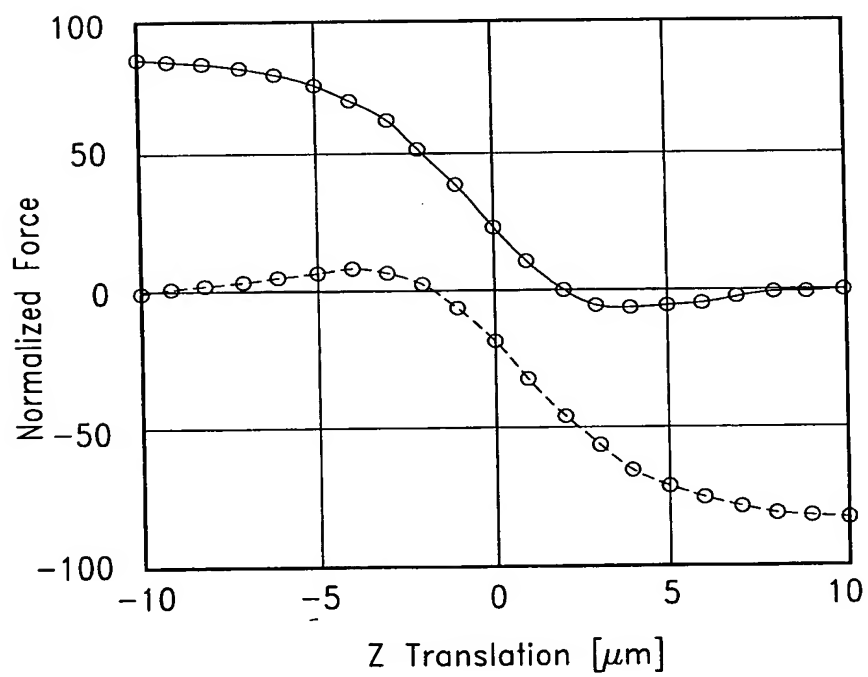
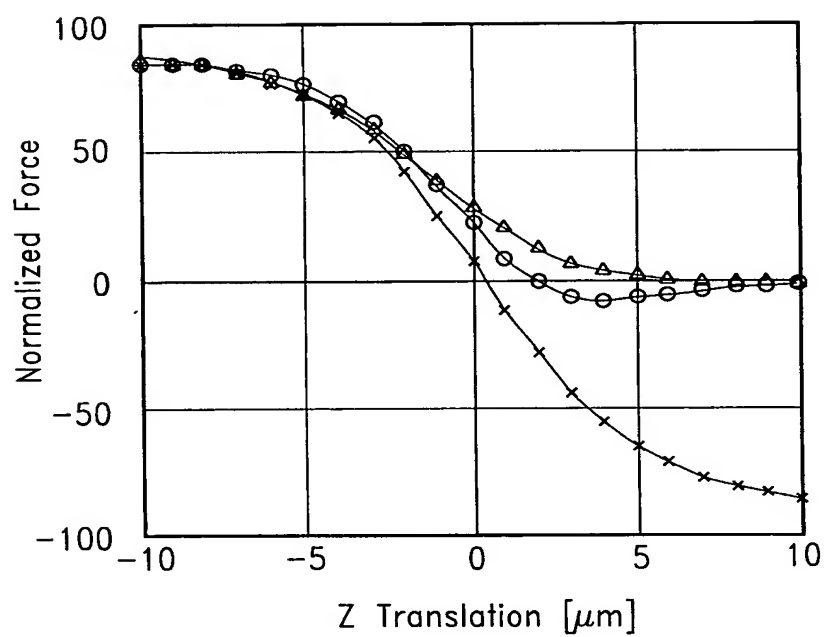
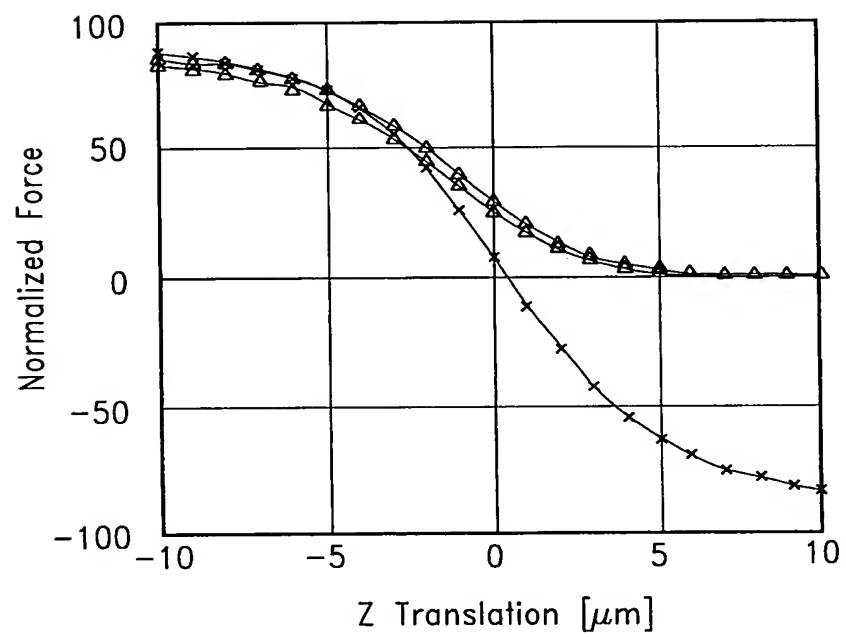


FIG.25



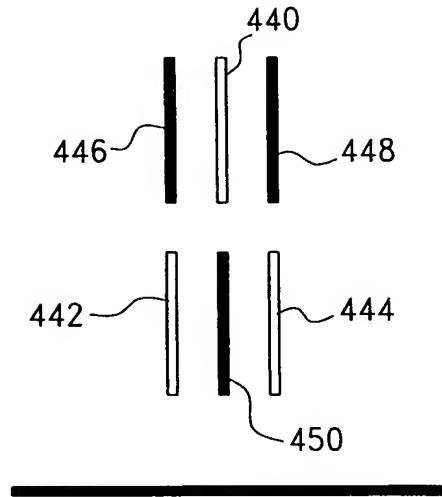
Comparison of multiple-level actuator designs  
Normalized force vs. displacement  
for design (a) ○, design (b)  $\Delta$ , and design (e) ×

FIG.26



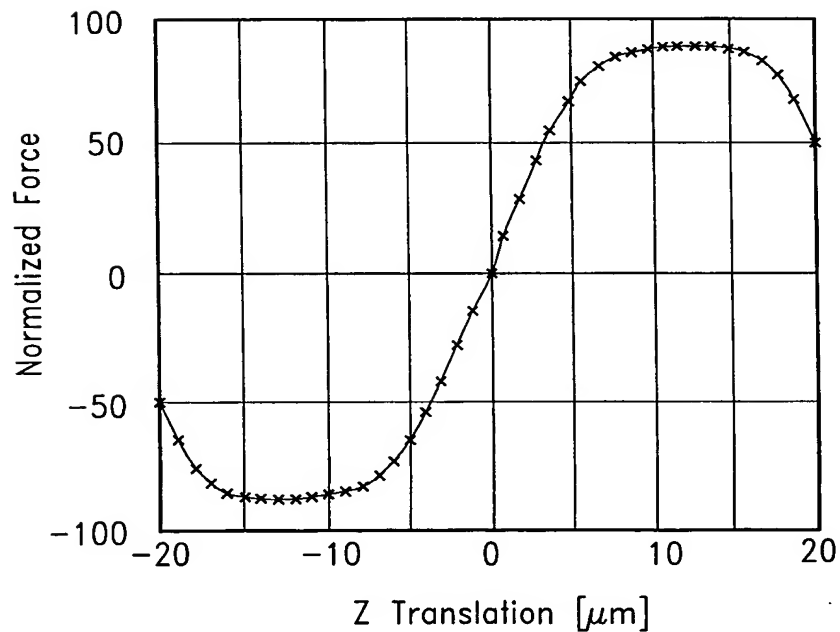
Comparison of push – and pull – modes  
of a bi-directional actuator (design (b))

FIG.27



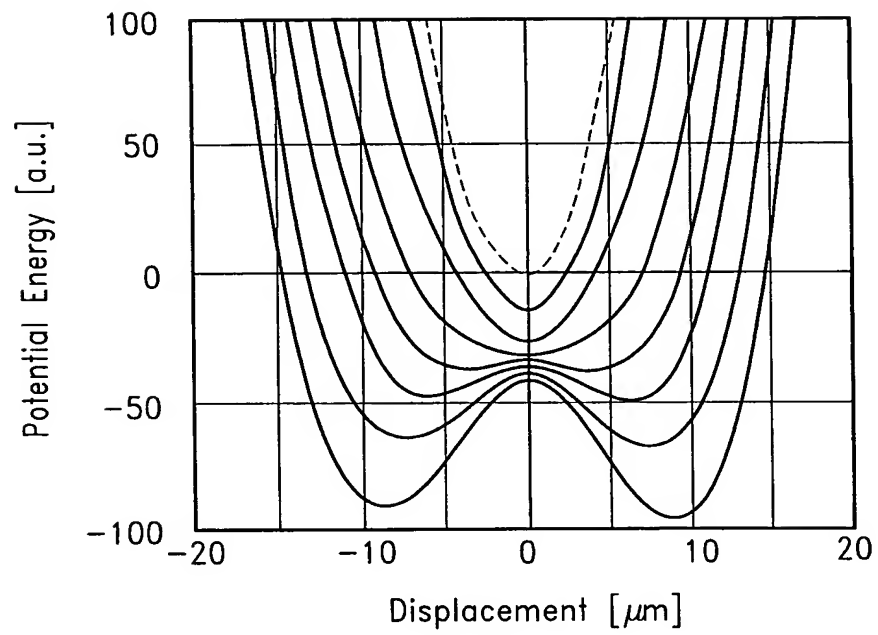
**FIG.28(a)**

Normalized force vs. displacement  
for a two-level bistable system  
-electrode bias conditions



**FIG.28(b)**

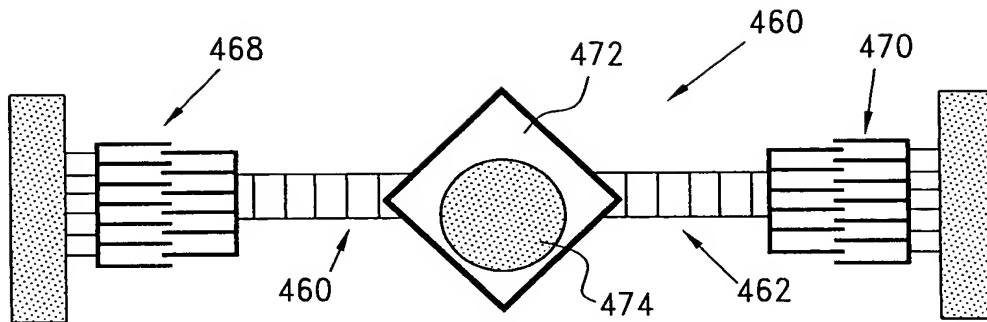
Normalized force vs. displacement  
for a two-level bistable system  
-force vs. displacement



Potential energy vs. displacement  
for the spring-actuator system  
(the dotted line is for no-applied force)

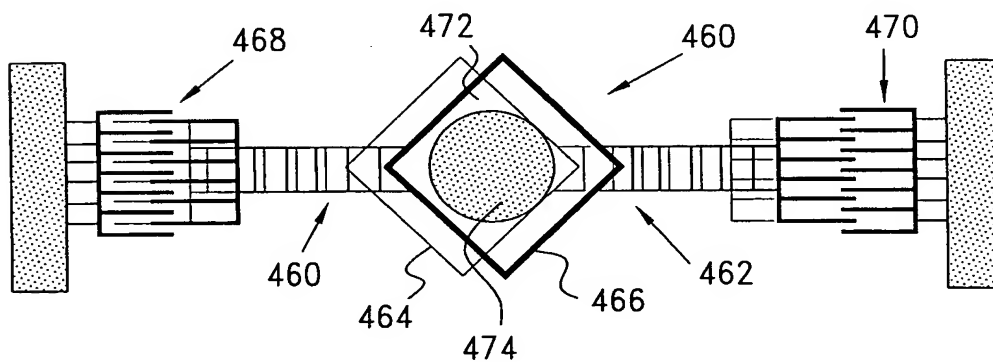
FIG.29





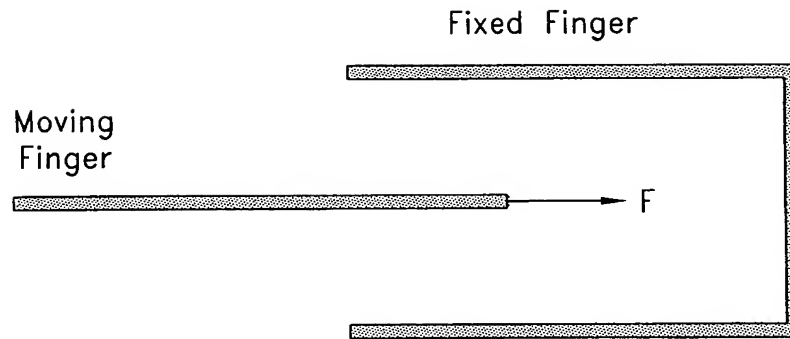
**FIG.30(a)**

Multiple-level Clamp-Alignment concept  
for the spring-actuator system  
-self-aligned initial position - no displacement of levels



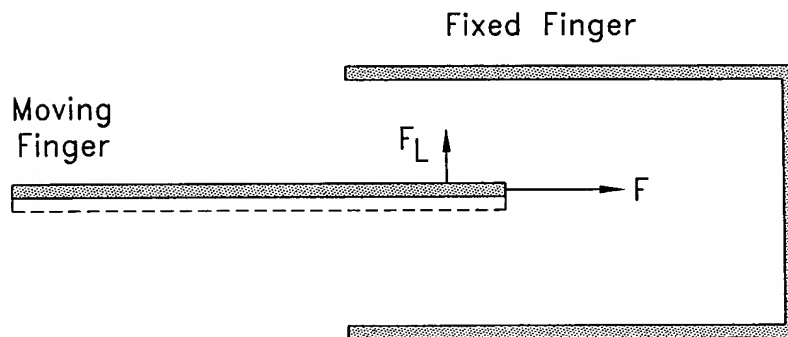
**FIG.30(b)**

Multiple-level Clamp-Alignment concept  
for the spring-actuator system  
-relative displacement and alignment of fiber



**FIG.31(a)**

Lateral instability in comb-drive actuators  
 -moving finger aligned at center -  $F_L=0$



**FIG.31(b)**

Lateral instability in comb-drive actuators  
 -moving finger off center